

# LAWA ARTS Data Analysis

Los Angeles World Airports  
Noise Management Bureau  
April, 1999

# Origin of Radar Signal

- FAA ASR-9 radar at each airport (two sensors at LAX) sends out radar interrogations and detects radar returns from all aircraft.
- ASR-9 data is collected in real-time by the FAA ARTS computer.
- ASR-9 determines the range and bearing of the aircraft based on the radar return, and receives altitude (as sensed by the aircraft's altimeter) and transponder code from the aircraft.



# Origin of Flight Identification

- FAA central computers collect flight plan information filed by airlines/pilots, and package this in an interfacility message (IFM) sent to the ARTS computer.
- IFM contains assigned transponder code, aircraft identification, aircraft type, scheduled time of operation, and other information.



# ARTS Merges Data Streams

- By matching transponder codes, the ARTS computer in San Diego merges the ASR-9 aircraft positional data with the IFM aircraft informational data.
- ARTS data is displayed for Air Traffic Control personnel in maintaining safe and efficient flight operations.
- ARTS data is sent, via LAN, to an ARTS Gateway computer that serves as access to authorized outside agencies.



# ARTS Gateway

- LAWA has a Memorandum of Agreement with the FAA to obtain the ARTS data.
- LAWA computers in San Diego interface directly with the FAA computers in real-time via the ARTS Gateway.



# LAWA ARTS Collection

- LAWA Noise Management Bureau's ARTS Collection and Editing System (ACES) was designed and installed by Dimensions International, Inc.
- A Bulk Collection Subsystem (BCS) in San Diego extracts data directly from the ARTS Gateway and converts polar positional coordinates to cartesian coordinates (typical for airport noise monitoring systems).



# LAWA ARTS Transfer

- A Display and Editing Subsystem (DES) in San Diego
  - gathers data collected by the BCS every day,
  - retains the data for three days (MOA-required aging period),
  - removes certain operations (e.g., military), and
  - filters based on range and altitude.
- The DES calls the Playback Only System (POS) at LAX every night, and sends the releasable data files for three LAWA airports.



# Sample Text View of a POS Releasable File

- File includes these fields:
  - Date/Time,
  - Aircraft ID,
  - Transponder code,
  - East-west and north-south distances from radar (in nautical miles),
  - Altitude (in hundreds of feet), and
  - Aircraft type

DATE/TIME	ACID	TRANS	"X"	"Y"	"Z"	ACTYPE
1999/091/07:00:00.3	USC727	4643	-0.48	-1.48	39	C310
1999/091/07:00:00.8	NWA338	7245	-2.31	-2.23	17	B752
1999/091/07:00:00.8	SKW7909	4727	-5.1	-1.36	35	E120
1999/091/07:00:01.8	SKW7949	4735	-17.91	7.88	39	E120
1999/091/07:00:01.8	UAL2073	3301	-6.57	2.99	80	B735
1999/091/07:00:02.3		1200	-7	3.09	22	
1999/091/07:00:02.3		1200	-3.63	3.47	26	
1999/091/07:00:02.8		1200	-0.07	11.06	13	
1999/091/07:00:03.4	AWE51	7231	21.51	12.19	193	A320
1999/091/07:00:03.4	NWA651	3665	10.84	4.11	39	B752
1999/091/07:00:03.4	SWA1665	4706	16.54	6.35	69	B737
1999/091/07:00:03.4	LRC690	1074	6.09	2.26	22	A320
1999/091/07:00:03.4	USA9	4152	22.8	8.63	89	B752
1999/091/07:00:03.4	ROA574	4772	1.5	0.3	6	MD80
1999/091/07:00:03.9	KHA35	2614	4.16	0.4	14	LJ25
1999/091/07:00:03.9		4747	0.24	-0.05	1	
1999/091/07:00:03.9		1200	6.45	2.89	6	
1999/091/07:00:03.9	DAL188	7256	22.25	-17.3	149	L101
1999/091/07:00:03.9		1200	10.2	0.25	5	
1999/091/07:00:04.4	SKW493	4746	4.07	-5.81	113	E120
1999/091/07:00:04.4	AAL74	1076	11.51	-15.82	117	DC10
1999/091/07:00:04.4	SKW7950	4745	2.91	-4.38	37	E120
1999/091/07:00:04.4		4734	0.74	-0.9	0	
1999/091/07:00:04.4		5500	13.48	-6.91	5	
1999/091/07:00:04.9		1200	23.7	-10.9	0	
1999/091/07:00:05.4	USC727	4643	-0.69	-1.37	39	C310
1999/091/07:00:05.4	NWA338	7245	-2.44	-2.46	18	B752
1999/091/07:00:05.4	SKW7909	4727	-5.35	-1.39	37	E120
1999/091/07:00:06.4	SKW7949	4735	-18.05	8.02	39	E120
1999/091/07:00:06.4	UAL2073	3301	-6.17	3.02	79	B735



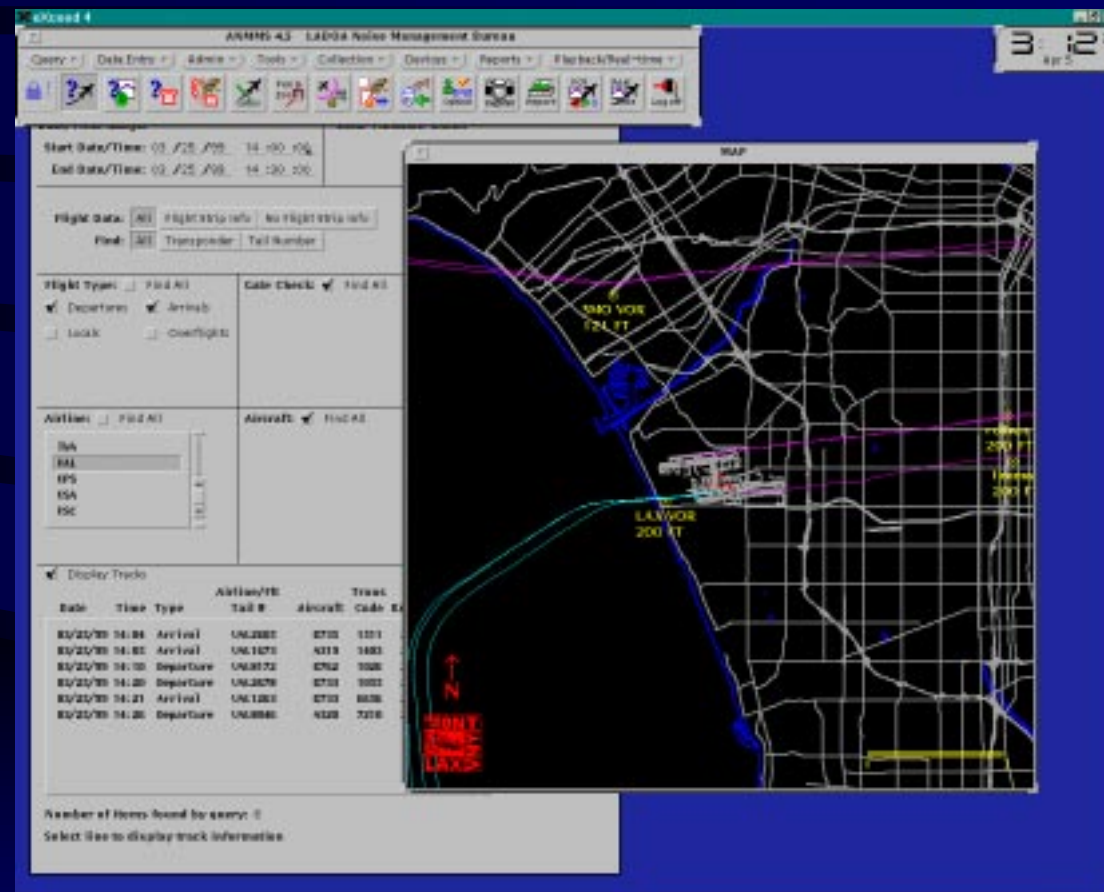


# LAWA ARTS Loading

- LAWA's Noise and Operations Monitoring and Analysis Display (NOMAD) software gathers the POS releasable data and loads the ARTS data into a searchable, viewable database.
- Separate LAWA computers are needed to manage "short-range" and "long-range" ARTS data due to the significant volume of data.



# NOMAD Main Screen



# NOMAD Track Query

- Track Query allows NOMAD users to search for flights that meet different criteria:
  - date/time of operation
  - departure/arrival/overflight
  - specific runway(s)
  - gate(s) penetrated
  - specific airline(s)
  - specific aircraft type(s)

The screenshot shows the 'Query Tracks (LAO)' window. It includes various search filters such as Date/Time Range, Zone Violation Check, Flight Data, Flight Type, Gate Check, FCA, Airline, Aircraft, and Runway. Below the filters is a table displaying the results of the query.

Date	Time	Type	Airline/Flt	Tail #	Aircraft	Trans Code	Runway
03/25/99	14:04	Arrival	UAL2085	E735	1511	240	
03/25/99	14:05	Arrival	UAL1673	A319	1483	251	
03/25/99	14:16	Departure	UAL8172	E762	1026	250	
03/25/99	14:26	Departure	UAL2079	E733	1033	250	
03/25/99	14:21	Arrival	UAL1263	E733	6026	240	
03/25/99	14:26	Departure	UAL8046	A320	7219	250	

Number of items found by query: 6  
Select line to display track information

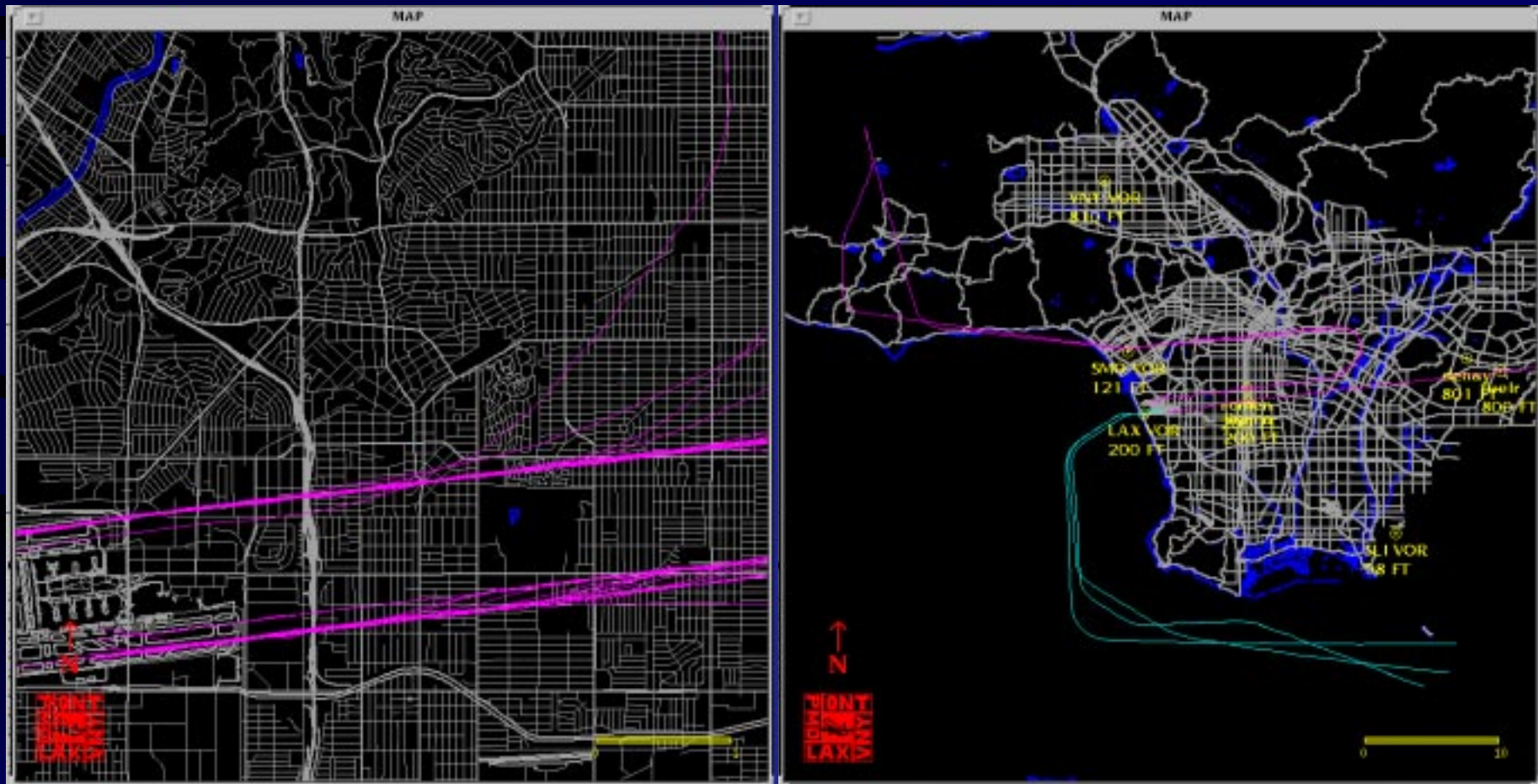


# NOMAD Track Detail

- Track Detail allows NOMAD users to view detailed information for particular flights, including altitude profile



# NOMAD Map Display



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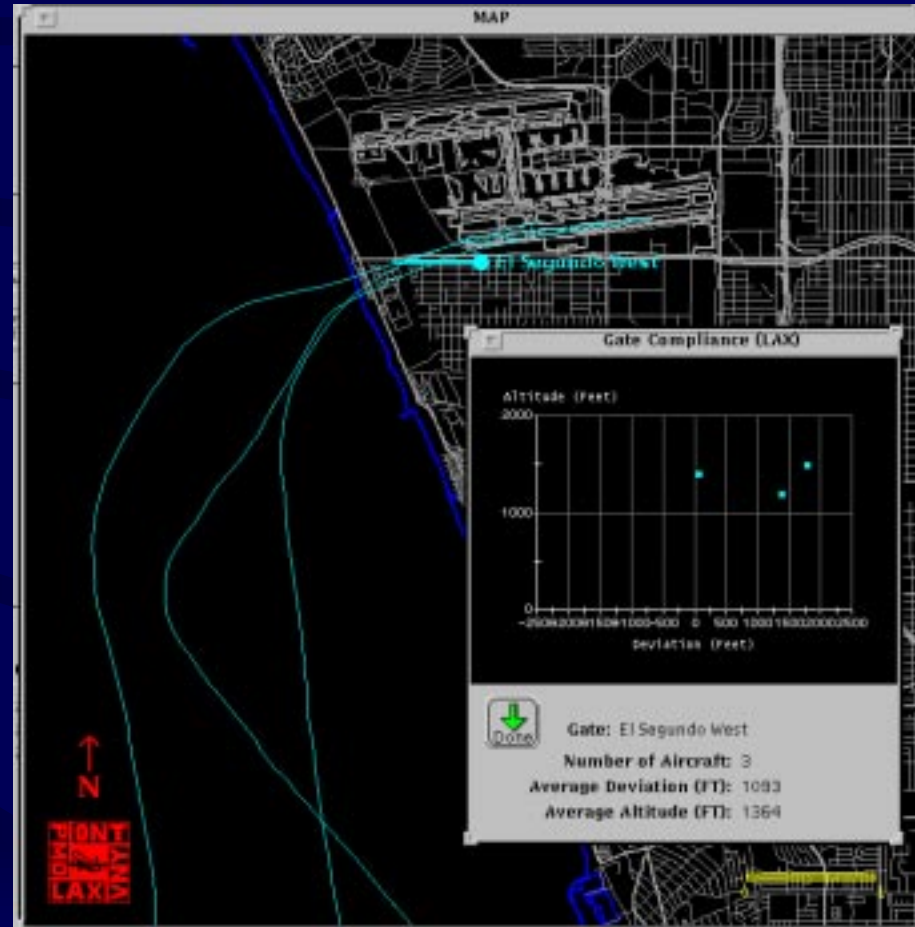
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# NOMAD Gate Query

- Use of two-dimensional gates allows NOMAD users to detect aircraft flying over particular neighborhoods and/or at a particular altitude



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# NOMAD Reports

Report Previewer

Page: 1 of 1  
Zoom Factor: Normal  
Orientation: Portrait

Done Prev Next Zoom Zoom None View Print

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Gate Penetration Recap Report LADDA Noise Management Bureau  
Gate: El Segundo West  
Date: Wed Mar 24 1999 00:00:00 through Thu Mar 25 1999 23:59:59 LAX  
Hours: All  
Airline: All  
Aircraft: All  
Runway: All  
Flight Type: Departure

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Penetration Date	Time	Trans	Aircraft ID	Aircraft Type	Operation	Distance from Gate Midpt (ft)	Penetration Altitude MSL (ft)	Penetration Speed (kts)
24-Mar-99	6:45	4720	ECGF211	SP34	D 25L	1387	1200	183
24-Mar-99	16:12	4634	N1015X	PA28	D 25L	87	1401	89
25-Mar-99	12:30	4602	LOF4781	JS32	D 25L	1785	1403	184

Total number of penetrations: 3



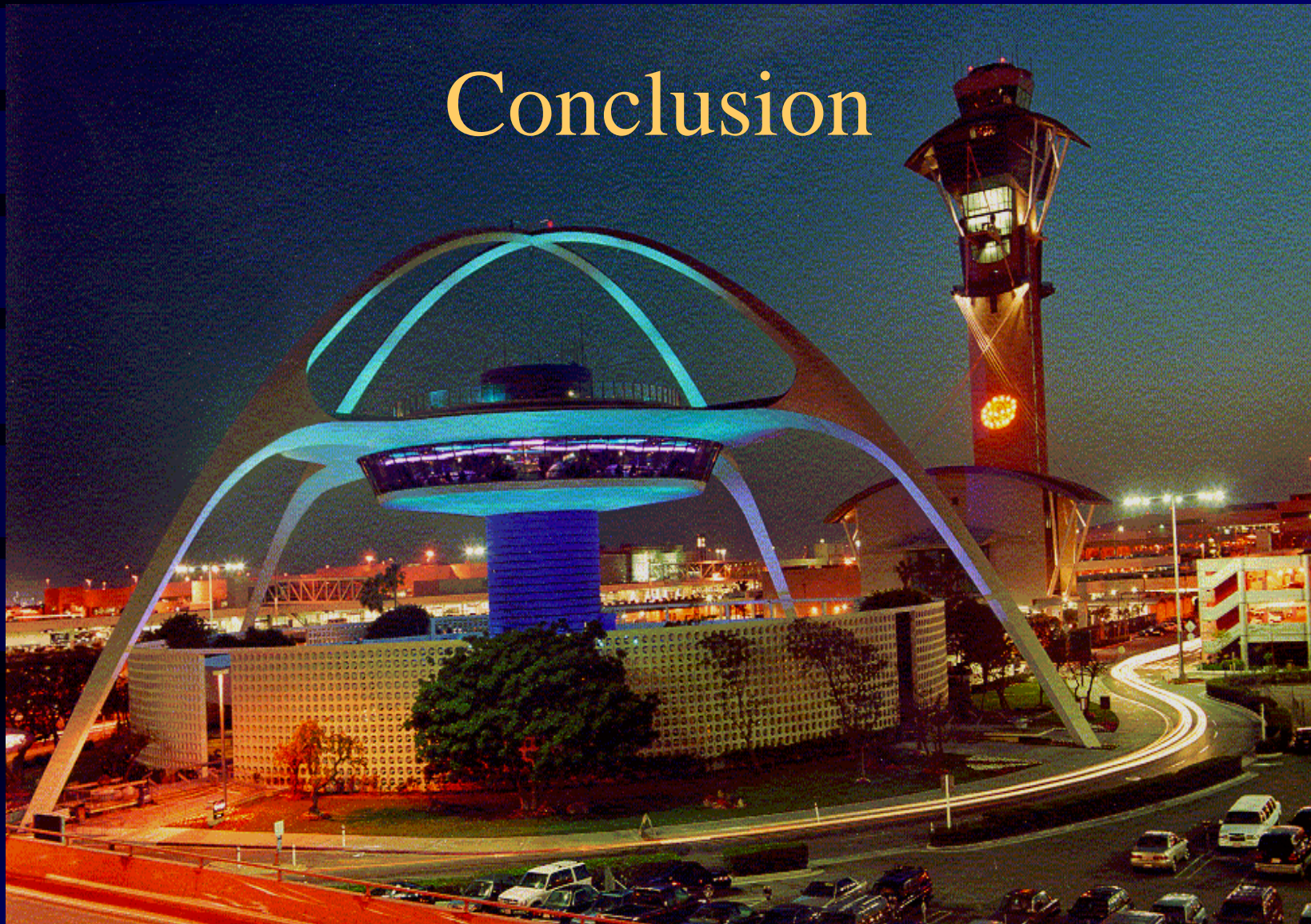
# NOMAD “VCR” Tool

- VCR-style playback allows NMB to review all previous flight activity at any specific time of day.





# Conclusion



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